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THE EXTINCT RODENTIA OF NORTH AMERICA.

BY PROFESSOR E. D. COPE.

THE order of Rodentia appeared in the Wasatch[1] Eocene epoch in North America, and has continued to the present time in gradually increasing numbers. No species of the order is yet known from the Puerco or lowest Eocene, nor are any known from older formations. The Wasatch Eocene has given us but few species, and these are members of a single genus. In the Bridger epoch the number of species was larger, and they belonged to several genera. The order displays a sudden expansion in the White River or Oligocene epoch. We know from this formation ten species of seven genera. From the John Day River formation we have twenty-one species of nine genera. The Upper Miocene Loup Fork epoch has yielded remains of nine species of seven genera. Four existing genera are represented by extinct species in the Miocene beds; two of these begin in the White River and two in the John Day epochs.

The four primary divisions of the order Rodentia are thus defined, principally after Brandt and Alston:

I. Incisor teeth $\frac{2}{2}$. Fibula not articulating with the superior condyle of the calcaneum. No intertrochlear crest of humerus.
  1. Mandible with the angular portion springing from the outer side of the bony covering of the lower incisor. Fibula distinct from tibia. "Malar bone not supported below by a continuation of the maxillary zygomatic process." An interpterygoid fissure . . . HYSTRICOMORPHA.
  2. Mandible with the angle in the plane of or springing from the inferior edge of the covering of the alveolus of the inferior incisor, more or less rounded; coronoid process high, falcate. Fibula distinct from tibia. No interpterygoid fissure.................. SCIUROMORPHA.
  3. Mandible with the angular portion springing from the inferior edge of the sheath of the inferior incisor (except Bathyerginæ). Fibula coössified with the tibia. Malar short, usually supported on a maxillary process. No interpterygoid fissure (except in Bathyerginæ)...... MYOMORPHA.

II. Incisor teeth $\frac{4}{2}$. Fibula articulating with the condyle of the calcaneum. An intertrochlear crest of humerus.
  4. No true alisphenoid canal; fibula ankylosed to tibia below; angle of mandible in the plane of the incisive alveolus............ LAGOMORPHA.

These groups, as is well known, include families and genera which display adaptations to various modes of life. Some are exclusively subterranean, others are arboreal, and some live on the surface of the ground. Of the latter, some are provided with formidable spines as a protection against enemies, while others depend for their safety on their speed. Of the latter character are the Rabbits of the Lagomorpha, and I have noted[1] how that they have superadded to the ordinary rodent structure certain points which also characterize the most specialized Perissodactyla and Artiodactyla among ungulates. The fusion of the inferior part of the fibula with the tibia (found also in the Myomorpha) belongs to the higher types of these orders. The strong intertrochlear ridge of the humerus is an especial feature of the groups mentioned, distinguishing them from the lower types in all the orders. The articulation of the fibula with the calcaneum, mentioned by Mr. Alston, is a character of the Artiodactyla. Associated with these is the elongation of the bones of the limbs, especially the posterior one. The modification of the tarsus in Dipus (the jerboas) evidently has a direct relation to the projectile force transmitted through the hind legs in rapid progression by leaping. Here the metatarsals are coössified into a cannon bone, though, as there are three bones involved, the result is somewhat different from the cannon bone of the Ruminantia.

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[1] For the positions of the American Tertiary epochs, see AMERICAN NATURALIST, 1882, March.

	Wasatch	Bridger.	White River.	John Day.	Loup Fork.
HYSTRICOMORPHA (porcupines).					
Hystricidæ.					
Hystrix L.	......	......	......	......	1
SCIUROMORPHA (squirrels).					
Mylagaulidæ.					
Mylagaulus Cope	......	......	......	......	2
Fam. ?					
Heliscomys Cope	......	......	1	......	......
Castoridæ.					
Eucastor Leidy	......	......	......	......	1
Castor L.	......	......	1	2	1
Ischyromyidæ.					
Plesiarctomys Brav.	3	7	......	......	......
Syllophodus Cope.	......	2	......	......	......
Ischyromys Leidy.	......	......	1	......	......
Sciuridæ.					
Meniscomys Cope	......	......	......	4	......
Gymnoptychus Cope	......	......	2	......	......
Sciurus Linn.	......	......	1	2	1
MYOMORPHA (rats).					
Muridæ.					
Eumys Leidy	......	......	1	......	......
Hesperomys Waterh.	......	......	......	1	1
Paciculus Cope	......	......	......	2	......
Geomyidæ.					
Pleurolicus Cope	......	......	......	3	......
Entoptychus Cope	......	......	......	5	......
LAGOMORPHA (rabbits).					
Leporidæ.					
Paleolagus Leidy	......	......	4	1	1
Panolax Cope	......	......	......	......	1
Lepus Linn.	......	......	......	1	......

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[1] Bulletin U. S. Geological Survey Terrs. IV, 362, 1881.

After a general view of the species and genera, some deductions as to the course of evolution of the order will be presented.

EOCENE RODENTIA.

PLESIARCTOMYS Bravard.

This is the prevalent genus of Rodentia of the Eocene period in North America. Specimens were first discovered by Dr. Hayden in Bridger beds of Wyoming, and were described by Dr. Leidy. I subsequently detected them in the Wasatch formation of New Mexico. Their remains are rather abundant in both formations, but display but little variety of form.

The teeth have short crowns and long roots, and have the general characters as well as numbers as the existing species of squirrels. There are, however, cranial characters which distinguish it from the existing forms of that family. The crowns of the inferior molars support four rather small and strictly marginal tubercles. There are five superior molars, of which the anterior is of small size. They resemble those of Sciurus, but the transverse

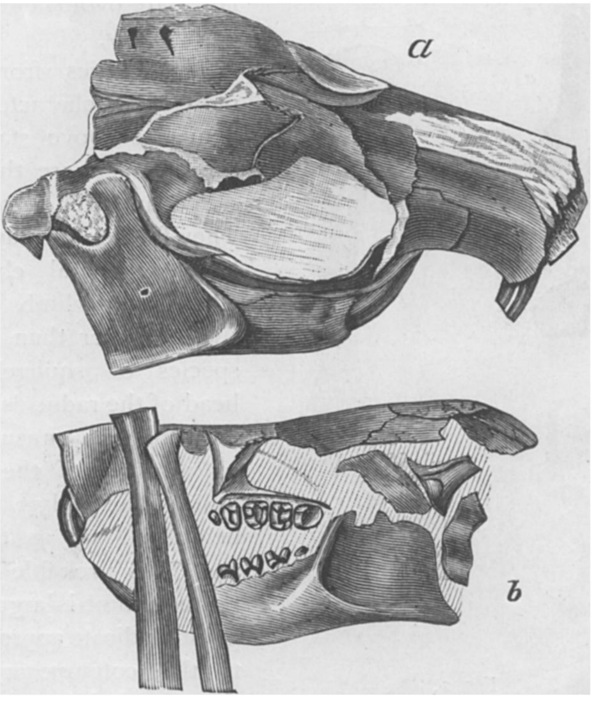

FIG. 1.—Parts of two crania and the ulna and radius of *Plesiarctomys delicatissimus* Leidy, natural size, from a block of the Wasatch bed of the Big Horn river, Wyoming. Original, from Vol. IV, Report U. S. Geol. Surv. Territories.

crests are obsolete or wanting. The positions corresponding to their external extremities are marked by more or less distinct cusps. There is a single internal tubercle of the crown. In the third and fourth molar of *P. delicatissimus* I observe rudiments of a second internal tubercle. The incisor teeth are compressed, with narrow anterior face. The enamel is not grooved, and is little or not at all inflected on the inner side of the shaft, while it is entirely so on the external face.

There is a large round *foramen infraorbitale exterius*, like that of Ischyromys and Fiber, and entirely unlike that of Gymnoptychus and Sciurus, conforming in this respect to the forms of the extinct group of the Protomyidæ of Pomel.

The cast of the brain indicates smooth oval hemispheres, which leave the cerebellum and olfactory lobes entirely exposed. The latter are ovoid and expanded laterally.

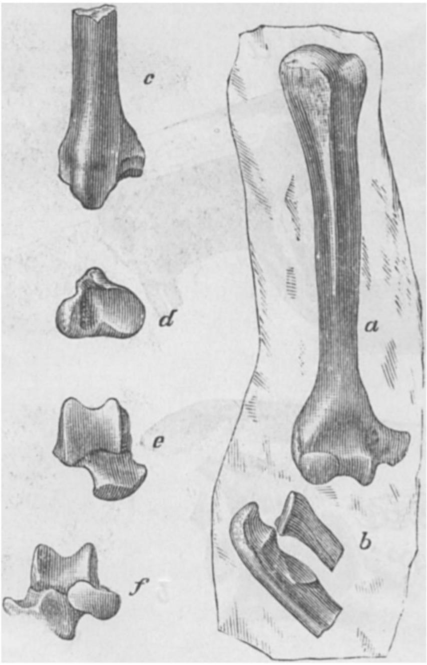

FIG. 2.

FIG. 2.—Bones of the specimens of *Plesiarctomys delicatissimus* Leidy, represented in Fig. 1. Fig. *a*, humerus, front view; *b*, proximal part of ulna and radius. Fig. *c*, distal part of tibia posterior side; *d*, same from below; *e*, astragalus from above; *f*, astragalus and calcaneum, distal ends. Original from Vol. IV, Report U. S. Geol. Survey Terrs.

The species from which most of the characters of the genus as above stated have been derived are the *P. delicatior* and *P. delicatissimus*. They further display the following general characters: The anterior limbs are relatively longer than in recent species of squirrels. The head of the radius is rounder, indicating an unusual power of rotation of the anterior limb. The pelvis is larger, being as long as the skull, and it is probable that the posterior limb is larger. These points indicate approximation to the cotemporary Mesodonta, or half lemurs.

No characters have yet been offered by which to distinguish the American species as representing a genus distinct from the *Plesiarcto-*

mys gervaisii of the French Eocene. Bravard briefly distinguishes the genus as distinct from Arctomys in the greater thickness of the angles of the molars, which thus become tubercles. Only the mandible and mandibular teeth of the *P. gervaisii* are known. It has been found in the Upper Eocene, near Perreal, Apt, France.

I have seen six species of this genus, of which two, *P. hians* Cope, and *P. undans* Marsh, belong to the Bridger beds only; one *P. leptodus* Cope, to the Washakie; one *P. buccatus* Cope, to the Wasatch and Wind river, and two, *P. delicatior* Leidy, and *P. delicatissimus*, Leidy, to all the Eocenes except the Washakie.

The following comparison of the *P. delicatissimus* with the *Sciurus niger*, or common gray squirrel, may be made. The pelvis is longer as compared with the bones of the fore leg. The humerus is longer as compared with the length of the ulna and radius. The species exceeds the *S. niger* in size, one-fourth linear.

It is then probable that the species of this, the oldest known genus of Rodentia, were arboreal, like the squirrels of the present geological period.

SYLLOPHODUS Cope.

This genus is much like *Theridomys* of the European Upper Eocene and Lower Miocene, and may be the same. The species were smaller than those of the last described, and are only known from lower jaws. These contain teeth which differ from those of Plesiarctomys in having cross-crests which are slightly connected at one side. They look like the unworn condition of Ischyromys, of which genus they may be the ancestor. Two species, *S. minimus* and *S. fraternus* have been described by Leidy. Both are from the Bridger horizon.

MIOCENE RODENTIA.

ISCHYROMYS Leidy.

The essential features are, dentition, I., $\frac{1}{1}$; C., $\frac{0}{0}$; M., $\frac{5}{4}$; the molars with two crescents on the inner side above, each of which gives rise to a cross-ridge to the outer margin. In the mandibular series the crests and crescent have a reversed relation. No cementum.

To the above characters given by Dr. Leidy, I have added the absence of postfrontal processes, and the superior position of the infraorbital foramen. Also that the pterygoid fossa is large, and that its inner and outer plates are well developed, and subequal.

The bones of the limbs are generally similar to those of the Sciuridæ. In this family the genus Gymnoptychus nearly resembles Ischyromys in dental characters. But besides the important difference in the former and position of the infra-orbital foramen, Ischyromys has an excavated posterior palatal border.

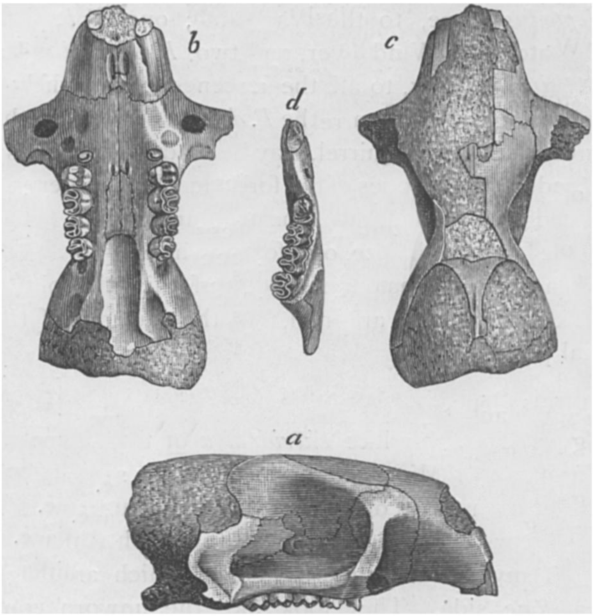

FIG. 3.—*Ischyromys typus* Leidy, natural size, from the White river beds of Colorado, original, from the Report U. S. Geol. Surv. Terrs. *a*, *b*, *c*, cranium; *d*, mandible from above.

Dr. Leidy remarks that this genus belongs to the family of the Sciuridæ. This is indicated by the dental characters; but in some other respects there is a greater divergence from the squirrels and marmots than is the case with the genus Gymnoptychus. Thus, the large *foramen infraorbitale anterius* occupies the elevated position at the origin of the zygomatic arch seen in the porcupines and cavies. There is no superciliary ridge nor post-orbital process as in most Sciuridæ, but the front is contracted between the orbits in the same manner as, but to a less degree than, in Fiber, and the Eocene Plesiarctomys Brav. Both the last named and Ischyromys present many points of resemblance to Pomel's tribe of Protomyidæ, but differ from any of the genera he has included in it.

This family is thus defined by Pomel :[1] " Infraorbital foramen as large as in the Hystricidæ, and by the position of the angular apophysis of the mandible almost in the general plane of the horizontal ramus. The jugal bone, at least in those species where we have observed it, is very much enlarged at its anterior portion, and the orbit is almost superior."

These characters apply to Ischyromys, excepting as regards malar bone, which is principally unknown in the latter.

Another family, the Ischyromyidæ, has been proposed by E. R. Alston, for the reception of this genus, to which he thinks with me[2] Plesiarctomys (=Pseudotomus) should be referred. He thus defines the family :[3] " Dentition as in Sciuridæ; skull resembling Castoridæ, but with the infra-orbital opening large, a sagittal crest; no post-orbital processes; palate broad; basioccipital keeled."

Doubtless Ischyromys belongs to an extinct family, but which of the above names is available for it I do not yet know. I would characterize it as follows:

Dentition as in Sciuridæ, infraorbital foramen large, superior; pterygoid fossa large, with well-developed exterior as well as inferior walls; a sagittal crest.

The superior position of the infraorbital foramen and the well-developed pterygoid laminæ are characteristics found in the Muridæ.

But one species of this genus is known, the *Ischyromys typus* Leidy. The skull is as large as that of a prairie marmot. The limbs are comparatively small, so that the animal was not probably arboreal in its habits.

SCIURUS Linn. (true squirrels).

In this genus the molars are $\frac{5}{4}$ or $\frac{4}{4}$, the first superior small when present. The grinding surfaces of the crowns when unworn present in the superior series a single internal cusp, which is low and anteroposterior. From this there extend to the external border of the crown two low transverse ridges, whose exterior terminations are somewhat enlarged. In the lower jaw the transverse ridges are not visible, and there is a low tubercule at each angle of the crown, between which there may be others on the border of the crown. Attrition gives the grinding surface of the latter a basin-like character. The *foramen infraorbitale* is a short, narrow fissure, situated in the inferior part of the maxillary bone in front of its tooth-bearing portion, but descending to the level of the alveolar border.

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[1] Catalogue Method. et Descr. de Vertebres Foss. de le Bass. de la Loire, 1853, p. 32.

[2] Annual Report U. S. Geol. Survey Terrs., 1873 (1874), p. 477.

[3] Proceed. Zool. Society London, 1876, p. 78.

The well-known characters of this genus are found in the mandibles of species which I obtained from the White River Miocene beds of Colorado and the John Day of Oregon. The teeth display the subquadrate form of this genus, without any tendency to the transverse enlargement seen in Arctomys, Cynomys, and Spermophilus. Two of the species, *S. vortmani* Cope and *S. relictus* Cope are as large as our gray and red squirrels, respectively, and the third, *S. ballovianus* Cope, is about the size of the *Tamias quadrivitatus* or Western chip-munk. The *S. relictus* is from the White River formation, and the two other species from the John Day.

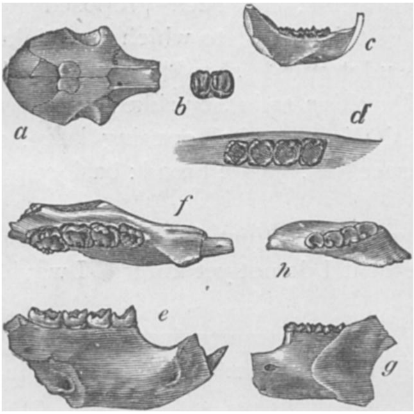

FIG. 4.—Skull and jaws of species of Sciurus; original, from Vol. IV Report U. S. Geolog. Surv. Terrs. Figs. *a–d*, *S. ballovianus*; *b* and *d*, superior and inferior molar teeth enlarged. Figs. *e–f*, *S. relictus*, enlarged one-half. *g–h*, *S. vortmani*, natural size.

GYMNOPTYCHUS Cope.

In dentition this genus is much like Ischyromys. There are only four superior molars.

As compared with the existing genera of squirrels, it differs in the structure of the molar teeth. The arrangement of the tubercles and crests is more complex than in any of them, excepting Pteromys. Thus in all of them there is but one internal crescent of the superior molars, and but two or three cross-crests; while in the inferior molars the arrangement is unlike that of the superior teeth, the cross-crests being marginal only. In Pteromys (F. Cuv.) the transverse valleys of the inferior series of Gymnoptychus are represented by numerous isolated fossettes. The structure of the molars in the fossil genus is exactly like that which I have described as found in Eumys, extending even to the details. This is curious, as that genus is probably a Myomorph.

The protrusion of the posterior extremity of the alveolor sheath of the inferior incisor on the outer side of the ascending ramus is not exhibited by the North American Sciuridæ which I have examined, nor by any of the extinct genera herein described, excepting Castor and the Geomyidæ. It is seen in a lesser degree in the house and wood mice, the jumping mouse and meadow mouse, all Muridæ.

Two species of this genus are certainly known. They belong to the White River horizon of Colorado. They differ, so far as known, chiefly in size, and in the proportions of the inferior premolar tooth. See Fig. 5.

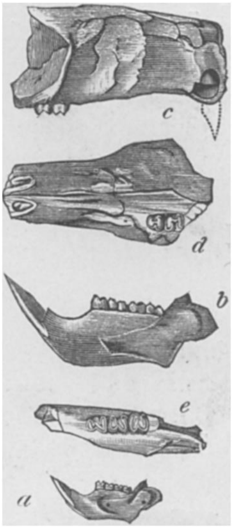

FIG. 5.—*a–d*, *Gymnoptychus minutus* Cope, from the White River bed of Colorado. *a*, natural size; *b–d*, enlarged, *e*, lower jaw of *Gymnoptychus trilophus* Cope, from above, enlarged; same locality. Original.

MENISCOMYS Cope.

This genus is readily distinguished from all the others here treated of, by the complexity of the structure of its molar teeth, and the curious resemblances that some of them present to the molars of the hoofed mammalia. They are without enamel inflections, and the triturating surface exhibits two external and one internal crescentic sections of the investing enamel. On the second superior molar there are three external crescents, and the first molar is simply conic. Between the inner and external crescents there are the curved edges of enamel plates directed obliquely and transversely. The grinding surfaces of the inferior molars display, in the unworn condition, curved transverse crests, connected longitudinally on the median line; on wearing, the lateral emarginations of the enamel become shallower, disappearing from the inner side, but remaining on the outer. Incisor teeth not grooved. *Foramen infraorbitale anterius* small inferior, and near the orbit. Postorbital processes; no sagittal crest.

The characters of the dentition of this genus resembles those of the genus Pteromys, which includes the large flying squirrels of Asia and the Malaysian archipelago, to which region they are confined. The superior molars differ from those of Pteromys in wanting all re-entrant enamel inflection.

The general characters of the skeleton are unknown. A femur is rather slender, and a tibia rather elongate, showing that the limbs are not short.

Four species of this genus are known to me, all from the John Day Miocene of Oregon. They differ considerably in the details of the structure of the molar teeth. Those of the *Meniscomys hippodus* are more prismatic than those of the other species, and the external face is not inflected at the grinding surface as in them. Nevertheless the molars have short roots. The arrangement of the crests of the crown of the superior molars is a good deal like that to be seen in the molars of some of the later three-toed horses, if the cementum be removed. (Fig. 6.)

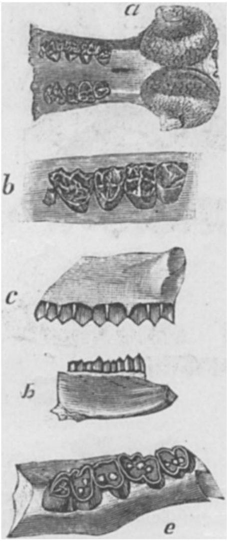

FIG. 6.—Cranium, jaws and teeth of *Meniscomys hippodus* Cope, from the John Day bed of Oregon; natural size and enlarged.

In the *M. cavatus* Cope (Fig. 7), the constitution of the superior molars is more complex, while that of the inferior molars is more simple. The bulla of the ear is set with simple transverse septa within, while in the *M. hippodus* their internal face has a reticulate structure like tripe. The superior molars of the *M. liolophus* Cope (Fig. 8, *a, b*) have their crests and cusps unwrinkled. In the *M. nitens* Marsh, they are complex and much wrinkled, while the lower molars

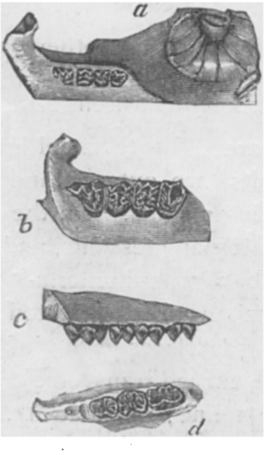

FIG. 7. — *Meniscomys cavatus* Cope, part of cranium and lower jaw of one individual from the John Day river, Oregon; nat. size and enlarged. Original.

are most complex with reticulate ridges. (Fig. 8, *c*.)

There is a suggestive resemblance between the forms of the molar teeth of the *Meniscomys hippodus* and those of the *Haplodontia rufa* now living in Oregon. The two genera have doubtless had a common origin, but the present differences are considerable. Thus the Haplodontia has an extended osseous cavum tympani, which does not exist in Meniscomys.

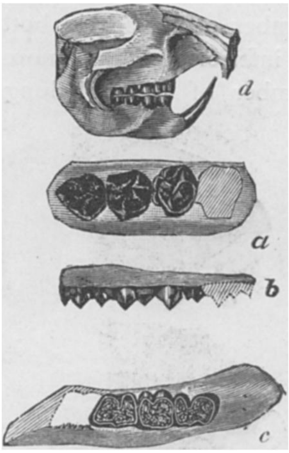

FIG. 8.—*a–b*, superior molars of *Meniscomys liolophus*, enlarged. *c*, inferior molars of *M. nitens* from above, enlarged. *d*, skull of the *M. hippodus*, nat. size. Original; from the John Day river, Oregon.

CASTOR Linn.

The beaver is the largest rodent of the northern hemisphere, and has the widest distribution. It was preceded in the Miocene period by a

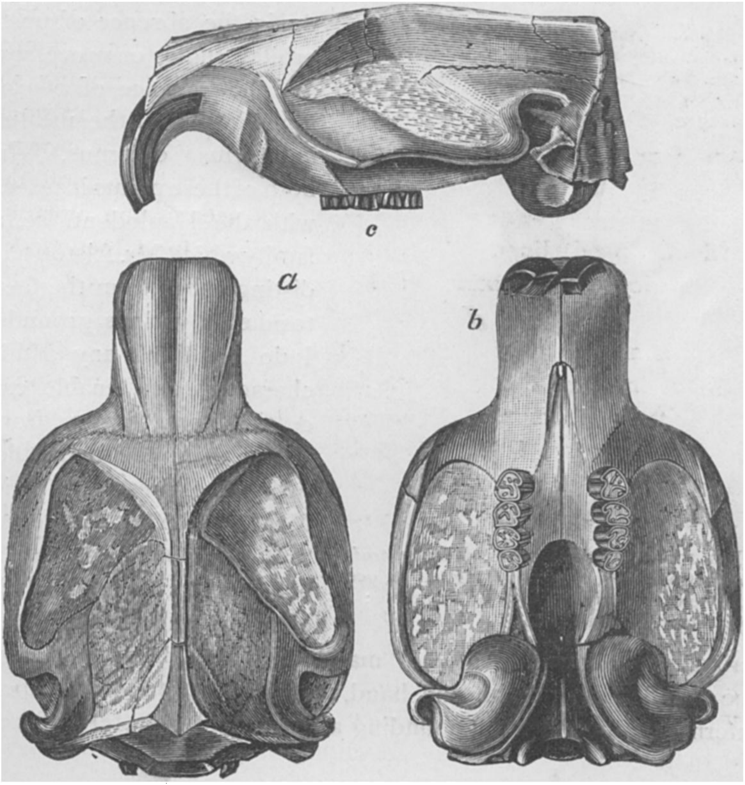

FIG. 9.—Skull of *Castor peninsulatus* Cope, nat. size. From the John Day epoch, Oregon. Original.

number of species in both the eastern and western continents, of inferior size and more restricted distribution. The greater number of these belong, I believe, to the same genus as the *Castor fiber*, though they have been separated under the name of Steneofiber Geoffr. There is no essential difference in the dentition, and it is probable that the extinct species had the peculiar flat tail of the modern beaver. The caudal vertebræ of the *C. pansus*, from Nebraska, have exactly the character of those of the beaver.

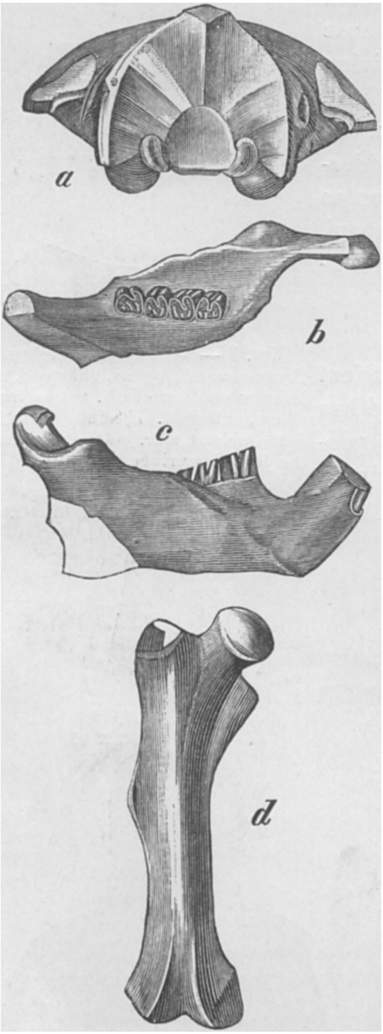

FIG. 10.—Skull and bones of *Castor peninsulatus* Cope, represented in Fig. 9. *a*, occipital view; *b*, *c*, right ramus of mandible; *d*, right femur. Natural size.

The family of the Castoridæ differs from the Sciuridæ in the absence of post-orbital angles or processes, and the presence of a prolonged tube of the meatus auditorius externus. In both of these points it agrees with the Haplodontiidæ, a family which Mr. Alston has distinguished from the Castoridæ on various grounds. I do not think any of his characters are tenable, excepting that drawn from the form of the mandible, which is expressed thus in Mr. Alston's diagnosis: "angular portion of mandible much twisted." This character will be better described as follows: Angle of mandible with a transverse edge due to inflection on the one hand, and production into an apex externally; the inflection bounding a large interno-posterior fossa.

The *Haplodonta rufa* is a curious burrowing rodent found in the Cascade mountains of Oregon, and is known as showtl or sewellel. It has no tail.

The longest known species of this genus is the *C. viciacensis*, which is common in the Miocenes in several parts of Europe. In North America the *C. nebrascensis* Leidy, is stated by Hayden and Leidy to be found in the White River formation. It is of about the same dimensions as the European species. So are the *C. peninsulatus* Cope, from the John Day River epoch of Oregon, and the *C. pansus* of the Loup Fork horizon of New Mexico and Nebraska (see Fig. 11). The smallest species is the *C. gradatus* Cope, a contemporary of the *C. peninsulatus* in Oregon. None of these species are nearly so large as the recent beaver.

EUCASTOR Allen.

Besides the preceding, there are some other forms of beavers in the late Tertiaries of North America and Europe.

The *Castor tortus* was described by Leidy from the Loup Fork formation of Nebraska. He coined the subgeneric name Eucastor for it without corresponding definition. In his monograph of the Castoridæ, J. A. Allen referred this species[1] to a genus distinct from Castor, and defined it, using for it Leidy's name Eucastor. This genus appears to me to be valid. The three genera of Castoridæ will then be defined as follows:

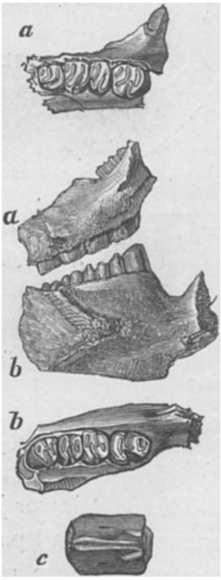

Fig. 11.—*Castor pansus* Cope, Loup Fork epoch; *a*, *b*, from New Mexico; *c*, caudal vertebra from Nebraska. Nat size. Original.

Molars and premolars with one inner and two or three outer folds .... *Castor*.

" Inferior premolar and third superior molar elongate, with four enamel folds; the rest with only two " .... *Diobroticus*.

Superior premolar enlarged, with one inner fold; inferior molars small, with two lakes .... *Eucastor*.

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[1] Monographs of North American Rodentia, Coues and Allen, U. S. Geol. Surv. Terrs., 1877, XI, p. 450.

The *Eucastor tortus* was larger than any of the extinct species of Castor, but was considerably smaller than the beaver. The *Diobroticus trogontherium* of Europe was a still larger species, one-fifth larger than the beaver in dimensions.

MYLAGAULUS Cope.

The reduction of the posterior molars, seen in Eucastor, is carried to a still higher degree in this genus. The last or fourth molar has disappeared, and the indications from the specimens are, that the third was early shed. The second is a small tooth, while the first is enormous, and performed the greater part of the function of mastication.

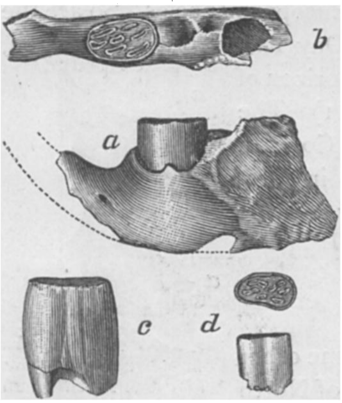

FIG. 12.—*a, b, c, Mylagaulus monodon* Cope, lower jaw and a separate tooth, natural size; *d, M. sesquipedalis*, first inferior molar, nat. size. Original. From the Loup Fork epoch of Nebraska.

The characters of the genus are: Inferior molars three, rootless; the first much larger than the others. Enamel inclosing the first molar not inflected; but numerous fossettes on the grinding surface of the crown, whose long diameter is anteroposterior.

The only lower jaw of a species of this genus in my possession presents a small part of the base of the angle and of the coronoid process. These parts are so nearly in the plane of the incisive alveolus as to lead to the belief that the genus Mylagaulus belongs to the sub-order Sciuromorpha. The rootless teeth with deep enamel fossettes approximates it to the Castoridæ, but it appears to me that a new family group must be established for its reception. Such characters are the presence of only three inferior molars, and the entire independence of the enamel fossettes of the external sheathing enamel. It is worthy of investigation whether the *Hystrix refossa* Gerv. has any relation to this family.

Two species of this genus are known: a larger *M. monodon* Cope, and a smaller, *M. sesquipedalis* Cope. Both are from the Loup Fork epoch of Nebraska. The former was about the size of the wood-chuck (*Arctomys monax*), to judge by the dimensions of its lower jaw. It is larger than the *M. sesquipedalis*, and has a different arrangement of the enamel fossettes. In that species, instead of being in three parallel lines, the middle line is only represented by its extremities. At the middle of the crown the fossettes of the internal line are incurved so as to be nearly in contact with the fossettes of the external line.

Heliscomys Cope.

Inferior molars four-rooted, the crowns supporting four cusps in transverse pairs. A broad ledge or cingulum projecting on the external side from base of the cusps. The inferior incisor compressed, not grooved, and with the enamel, without sculpture.

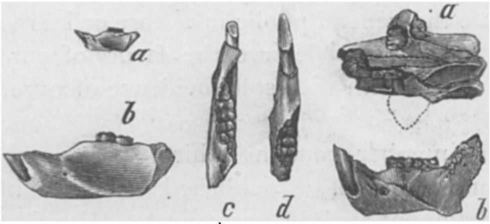

Fig. 13.—*a–d*, lower jaws of *Heliscomys vetus* Cope; *a*, natural size; *b, c, d*, enlarged; *e, f*, *Eumys elegans* Leidy, natural size; *e*, cranium from above; *f*, left ramus of lower jaw, external side. All from the White River epoch of Colorado. Original.

This genus is only represented by a small number of specimens, which are mandibular rami exclusively. Its special affinities therefore cannot be ascertained, and even its general position remains somewhat doubtful. There is some probability, however, that it belongs to the Myomorpha, as the type of dentition is much more like that of the genera of that group than those of the Sciuromorpha. To the Hystricomorpha it does not belong.

As compared with known genera of Myomorpha, it is at once separated from many of them by the presence of a premolar tooth. Among recent genera of this sub-order, Sminthus possesses this tooth in both jaws, and Meriones in the upper jaw only. It is present in both jaws in the Sciuromorpha generally. The tubercles of the teeth resemble those of the Muridæ, but their disposition is unlike that of any existing North American genus. A remote approximation to it is seen in the genus Syllophodus of the Bridger Eocene formation, where there are four subquadrate molars with tubercles; but the latter form two transverse crests, with an additional small intermediate tubercle, and the wide cingulum is absent.

But one species of Heliscomys is known, the *H. vetus*, from the White River epoch of Colorado. It is not larger than the domestic mouse (*Mus musculus*).

(To be continued.)